

AD-A 251 288

Best Available Copy

92-15643

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION Student Detachment US Army War College		6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Carlisle Barracks PA 17013-5050			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION USAWC-SSI		8b. OFFICE SYMBOL (If applicable) AWCI	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
9c. ADDRESS (City, State, and ZIP Code) Carlisle Barracks PA 17013-5050			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
11. TITLE (Include Security Classification) Operational Aspects of a Forward Support Battalion Participating in Operations DESERT STORM and DESERT STORM					
12. PERSONAL AUTHOR(S) Daniel L. Fairchild					
13a. TYPE OF REPORT MSP		13b. TIME COVERED FROM: _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 92-04-15	
15. PAGE COUNT 34 text					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Logistics, FSB, ODS, Transport, AFS, Mobility, BSA, Refuel, Doctrine		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) See reverse.					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL DOUGLAS V. JOHNSON II, LTC, US Army			22b. TELEPHONE (Include Area Code) (717) 245-3010		22c. OFFICE SYMBOL AWCI

Operations in the deserts of Southwest Asia presented enormous challenges to a forward support battalion supporting a heavy maneuver brigade during Operations Desert Shield and DESERT STORM. Most of these challenges were METT-T driven. Logistics doctrine of forward support proved to be basically sound, but unachievable at times. Perhaps the most significant lesson learned was the validation of the sustainment imperatives advocated by Airland Battle doctrine. The imperatives of anticipation, integration, continuity, responsiveness, and improvisation were the key to logistics success in a theater of operations void of many "taken for granted" resources and necessities. Other lessons were learned concerning movement to contact operations, tailoring combat service support assets for deep operations, equipment modifications, equipment and personnel authorizations, and the brigade support area's design. The ten weeks of post combat operations represented the best training period in the battalion's history. In addition to sustaining a brigade task force, humanitarian care and supplies were provided to hundreds of civilian refugees and enemy prisoners of war fleeing Saddam Hussein's reign of terror in post war southern Iraq.

USAWC MILITARY STUDIES PROGRAM PAPER

The views expressed in this paper are those of the author and do not necessarily reflect the views of the Department of Defense or any of its agencies. This document may not be released for open publication until it has been cleared by the appropriate military service or government agency.

OPERATIONAL ASPECTS OF A FORWARD SUPPORT BATTALION PARTICIPATING
IN OPERATIONS DESERT SHIELD AND DESERT STORM

by

Lieutenant Colonel Daniel L. Fairchild
United States Army

Lieutenant Colonel Douglas V. Johnson II
Project Adviser

U.S. Army War College
Carlisle Barracks, Pennsylvania 17013

DISTRIBUTION STATEMENT A: Approved for public
release; distribution is unlimited.

ABSTRACT

AUTHOR: Daniel L. Fairchild, Lt Col, USA

TITLE: Operational Aspects of a Forward Support Battalion
Participating in Operations Desert Shield and
DESERT STORM

FORMAT: Individual Study Project

DATE: 15 April 1992 PAGES: 40 CLASSIFICATION: Unclassified

Operations in the deserts of Southwest Asia presented enormous challenges to a forward support battalion supporting a heavy maneuver brigade during Operations Desert Shield and DESERT STORM. Most of these challenges were METT-T driven. Logistics doctrine of forward support proved to be basically sound, but unachievable at times. Perhaps the most significant lesson learned was the validation of the sustainment imperatives advocated by Airland Battle doctrine. The imperatives of anticipation, integration, continuity, responsiveness, and improvisation were the key to logistics success in a theater of operations void of many "taken for granted" resources and necessities. Other lessons were learned concerning movement to contact operations, tailoring combat service support assets for deep operations, equipment modifications, equipment and personnel authorizations, and the brigade support area's design. The ten weeks of post combat operations represented the best training period in the battalion's history. In addition to sustaining a brigade task force, humanitarian care and supplies were provided to hundreds of civilian refugees and enemy prisoners of war fleeing Saddam Hussein's reign of terror in post war southern Iraq.



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE OF CONTENTS

<u>Section</u>	
INTRODUCTION	1
BACKGROUND	3
PREPARATION FOR DEPLOYMENT	5
DEPLOYMENT	6
PREPARATION FOR COMBAT	8
COMBAT OPERATIONS	11
POST COMBAT OPERATIONS	16
REDEPLOYMENT	19
LOGISTICS OPERATIONS (DOCTRINE vs DESERT STORM)	20
OFFENSIVE AND DEEP OPERATIONS	22
MOVEMENT	26
COMMAND AND CONTROL	28
REFUEL OPERATIONS	29
SECURITY	30
BRIGADE SUPPORT AREA	31
LESSONS LEARNED/RECOMMENDATIONS	35
CONCLUSION	40
APPENDIX	A-1

Introduction

The purpose of this paper is to address brigade level logistics operations within a forward support battalion during Operations DESERT SHIELD and DESERT STORM and evaluate the operations according to doctrinal criterion. The Southwest Asia operations presented enormous logistics challenges to a forward support battalion supporting a heavy maneuver brigade. Although logistics doctrine proved basically sound, the vast area of operations, the desert terrain, the absence of land routes, extreme weather, and a several hundred kilometer movement to contact operation demanded that logisticians exercise flexibility and innovation in sustaining a modernized heavy combat force. Adjustments to standard procedures were necessary in every category of combat service support and new ground was covered in movements, security, task organization, and command and control.

Perhaps the best guidance offered by doctrine is contained in Field Manual (FM) 63-20, Forward Support Battalion in a discussion of sustainment principles. The discussion centers around the sustainment imperatives of anticipation, integration, continuity, responsiveness, and improvisation.¹ Logisticians found these imperatives the key to success in a theater of operations void of so many "taken for granted" resources and necessities. For all practical purposes there were no roads, no water points, no fuel points, no food sources, no buildings, no civilized

infrastructure, no "anything".

Everything had to be put in place. With the exception of world class aerial and seaports, Saudi Arabia offered a "zero-based" theater of operations. The term zero-based is used to mean less than bare-based. Looking back, the operations in Southwest Asia put logisticians at all echelons to a demanding test of sustaining military forces over a protracted period. In the initial phases of the military build up, theater level logisticians were able to coordinate with Saudi officials and make arrangements for available host nation support. For the most part this support consisted of transportation services, bottled water, food, and fuel supplies.

While world class aerial and ocean ports coupled with host nation support certainly equates to more than a zero-based area of operations, this document centers at brigade level--a level focused forward toward the front and beyond. Ports and transportation assistance are merely waypoints along the way to a brigade's area of interest. How supplies such as food and water make it to the end of the line is of little concern to these soldiers--that they do in fact make it is all that counts. The forward support battalion ensures that these front line soldiers receive the combat service support needed to maintain health and morale and to fight and win.

Background

This account documents the actions of a forward support battalion based in Germany and just entering a programmed inactivation under the terms called for in the US/USSR Conventional Forces in Europe (CFE) negotiations when alerted for deployment to Southwest

Asia.

In August 1990, the battalion was preparing for a September 1990, deployment to Grafenwoehr Training Center to support its brigade during division gunnery. Upon completion of gunnery, the brigade would cross over to Hohenfels for a Combat Maneuver Training Center (CMTC) rotation. The battalion's summer training program centered around two key events, a medical external evaluation (MEDEXTEV) and a logistics exercise (LOGEX). Both were brigade wide events that were planned and executed by the support battalion. Both proved extremely beneficial during the following months. Another key training event occurred simultaneously with the Grafenwoehr gunnery. Having just fielded Mobile Subscriber Equipment (MSE), the division conducted an MSE verification command post exercise (CPX). This system greatly enhanced the support battalion's ability to communicate both externally and internally.

While at Grafenwoehr and Hohenfels, the battalion operated entirely from field locations for the six weeks period. At one point the battalion was supporting elements of the brigade in three widely dispersed locations--Grafenwoehr, Hohenfels and Gelnhausen (home station). Resupply operations were conducted over extended distances and proved to be invaluable training for the months ahead. By mid-October, about halfway through the CMTC rotation, the division leadership began incorporating and emphasizing training not normally associated with a Germany based division. The most obvious was the emphasis placed on aerial resupply of commodities such as water and repair parts. The official word was that the brigade and battalion

would still begin CFE inactivation upon return to Gelnhausen, but thoughts of deployment to the Persian Gulf region began cropping up.

Since the fall of the Berlin Wall in November 1989, the division had been changing its focus of the last forty years. The old "defense of the Fulda Gap" focus was slowly evolving into a "movement to contact" operation since there was no longer an internal German border. Offense became the buzz word, with the principal concept of a long movement to contact operation being a key METL (mission essential tasks list) item. This new focus was also incorporated into the CMTC scenario.² At Hohenfels the support battalion tailored elements designed to support a task force during movement to contact operations. The concept was a basic support forward operation providing key logistics such as fuel, ammo, maintenance and medical services. The term R³ (rearm, refit, refuel) was used to describe the support element. An expanded version of the R³ element became the battalion's principle concept of support during the ground campaign of Operation DESERT STORM and will be addressed in detail later.

As the CMTC rotation ended, on 31 October 1990, the battalion redeployed to home station. One of the battalions within the brigade was already within the inactivation window of CFE. The first week of November 1990 was filled with post combat operations and initial meetings and briefings concerning eventual base closure.

Preparation for Deployment

The very next week, the battalion's focus was completely turned around. On 8 November 1990, the Secretary of Defense announced that the division would deploy to Saudi Arabia.³ An additional U.S. Army

Corps would provide the coalition forces in support of United Nations' sanctions an offensive capability to free Kuwait by military force if necessary.

Preparation for deployment to Southwest Asia began immediately. There was a never ending list of things to do and to check. General guidance from higher headquarters was, if you think you will need it, then take it. Additional funds were made available to buy local supplies and materiel that might be needed and were difficult to get through the Army's supply system. Soldiers' personal items had to be packed and stored. Families had to be cared for. Arrangements were made for the children of single-parent soldiers. Additional equipment was received to fill shortages. Desert environment peculiar spare parts were ordered. Medical records were checked; shots were taken; teeth were fixed. Wills and powers-of-attorney were initiated and completed. Personnel replacements reported to the battalion. Rear detachment decisions were made. Chains-of-concern were updated. Elimination procedures were initiated. Station property was inventoried and hand receipted. It was a busy time.

Deployment

The majority of the battalion's equipment was moved to ports on 8 December 1990. The advance party's equipment had moved on 1 December 1990. Equipment movement operations went extremely well. Tracked vehicles were railed to port from home station; wheeled vehicles convoyed to Mannheim and were loaded on barges for shipment to port. All that remained were several "40 foot" containers that were filled with supplies. These containers were moved to ports by contractors.

Many arrived late to Saudi Arabia and their contents were never fully utilized.

Battalion personnel deployed to Saudi Arabia on several flights from aerial ports in Germany. Most flights originated during 20-27 December 1990, and the battalion closed in Saudi Arabia on 29 December 1990. Upon arrival the battalion, along with its supported brigade, was quartered in a complex of high rise apartment buildings in the city of Khobar. The buildings had been constructed several years prior but had remained unoccupied because the intended tenants had refused to move in. Accommodations were much better than expected. Most other units in country had initially processed through sites such as "tent city" and "cement city", compounds with no conveniences whatsoever. In fact, our temporary quarters were referred to as the "MM Grand". Showers, running water, commodes, and carpeting made us the envy of those billeted elsewhere.

The next step was to await arrival of our equipment. This became a frustrating period. At ports in Europe, unit equipment had been piecemealed onto several ships. In all, the battalion's equipment arrived at the port of Dammam, Saudi Arabia on approximately fifteen ships spanning a time from the last week of December 1990 to the second week of February 1991. Port operations were further complicated by the distance between the MM Grand and the port, and the lack of transportation between the sites. This problem was eventually eliminated as more equipment arrived.

Preparation for Combat

The battalion's advanced party moved from port to the division's tactical assembly area (TAA) on 31 December 1990. Convoy distance to the TAA was 350 miles via a northern route or 550 miles via a southern route. During the next six weeks the battalion moved from port to the TAA as equipment arrived and convoys were scheduled. The battalion did not close on the TAA until 12 February 1991, when some of the battalion's most critical assets, 5,000 gallon fuel tankers, arrived at the field site.

Initial operations at the TAA were particularly frustrating for logisticians. Because much of the support battalion's equipment arrived after supported units equipment, normal logistics support operations were modified from the very beginning. To compound and further complicate matters, the division's main support battalion's equipment also arrived after the bulk of the division's combat units. Early combat service support operations consisted of units supporting themselves. Support battalion personnel, at best were only able to provide units with information. It was up to individual units to execute. Many hours and days were unproductive because the truth changed and supplies reported to be at certain locations were either at other locations or could not be found. The difficulty was further compounded because, out of necessity, personnel were working outside their normal realm of expertise. As more equipment and personnel arrived in the TAA, the logistics burden placed on combat units began to ease. At least the forward support battalion was able to partially support and service the brigade. Doctrine was still not in effect (nothing was pushed forward

to the brigade support area), but a proactive support battalion could support its brigade by going wherever and whenever necessary to obtain supplies. Support platoons of the combat battalions also contributed greatly by consolidating transportation assets under the support battalion's control. This concept would be expanded and pay big dividends during post combat operations.

In mid February 1991, the division moved from the TAA to a forward assembly area (FAA). This move positioned the division for the start of the ground campaign. It also gave the division valuable training in movement control operations and maneuverability while in formation over the desert terrain. It was the first time that the division had had the opportunity to practice a full scale movement to contact operation, and it served to boost morale of soldiers who now knew such a massive undertaking was possible. The day prior to moving to the FAA, the support battalion, along with the other battalions in the brigade task force, positioned portions of their units at Log Base Echo. This element encompassed approximately 500 soldiers and 250 vehicles and represented portions of the brigade task force not essential to supporting the brigade's initial push into Iraq. Equipment within this package was less mobile than the R³, and it might have slowed the rate of advance into Iraq. Those within the Brigade task force referred to the package as the "Fat Lady". Plans were developed for the "Fat Lady" to follow the axis of advance 24 hours later. That allowed sufficient time for the rest of the division to pass. Our brigade task force was the lead in the division's "brigades in column" formation during the initial movement to contact into

Iraq. Delaying the "Fat Lady" by 24 hours may have enabled the combat power in the following brigades to close with the enemy faster.

Time in the FAA was spent making final plans and preparations for combat. For logisticians within the brigade task force that meant ensuring basic loads of food, fuel, ammo, and water were on hand. Additional equipment and supplies continued to be received up until the very last day prior to the ground campaign. Examples are: HEMTT cargoes, HEMTT fuelers, V-Packs for the M1A1 tanks, and fratricide prevention kits. The new vehicles necessitated continuous refinements and adjustments to the R³ and "Fat Lady". Coordination and actual adjustments of equipment and personnel were not difficult since their respective locations were only about sixteen miles apart.

Combat Operations

On the morning of 24 February 1991, the division began its movement toward the line of departure (LD), which roughly equated to the border between Saudi Arabia and Iraq. The plan was to creep into position for the attack which was to occur on 25 February. However, the situation quickly changed, and the brigade was ordered to continue the advance.⁴ The lead element of the brigade crossed the LD at 1430 hours, and the trail element (R³) crossed at approximately 1600 hours. A sandstorm limited visibility much of the day, and just staying in formation and keeping from getting lost were the major challenges on the first day of the ground campaign. Four hours after crossing the LD, the

brigade task force laagered for the night. While the division had moved farther than expected, some elements had yet to cross the LD. The movement to contact would continue the following day. After the first day of the ground campaign there was very little logistically to adjust. The two left columns of the R³'s eight column formation were temporarily separated from the main body due to the distance between the breaches in the Iraqi berms and to the intensity of the sandstorm. Shortly after nightfall, the separated elements rejoined the main body and the R³ was again intact. Though the brigade had met with little resistance, enemy prisoners of war (EPWs) began surrendering shortly after it entered Iraq. Taking EPWs so soon had not been anticipated, but the support battalion was able to adjust by shifting some loads and utilizing some of the newly acquired HEMTT cargoes to assist the military police in evacuating the EPWs rearward. After refueling operations were completed, empty support battalion tankers were marshalled, ready to get an early start to a prearranged trailer transfer point the following morning (standard procedure whenever the brigade laagered). The battalion's location was approximately thirteen miles inside Iraq.⁵

Movement to contact continued on 25 February 1991. The day was a virtual repeat of the previous with just a little more enemy activity encountered by the brigade. The division now had two brigades abreast with one in reserve. Our brigade was the division's left, or western, flank. To our left was another division. Vantage points offered a spectacular view of a heavy armored force spreading from horizon to horizon in all directions. Just the sight

of such a large and potent force gave soldiers confidence and a sense of invincibility. The brigade laagered approximately 71 miles north of the Saudi-Iraqi border.⁶ Late that night, the brigade received orders to attack east and seize an objective just west of the Iraqi-Kuwaiti border. Elements of the Republican Guard forces were reported to be between the brigade and the objective.

On 26 February 1991, the brigade turned east and began its march toward the northwest Kuwaiti border. Around noon brigade scouts began to encounter increased enemy activity. By 1400 hours, a sandstorm had reduced visibility to less than two miles.⁷ At 1430 hours the brigade halted for refuel operations. At this halt, the brigade commander instructed the support battalion commander to establish a brigade support area (BSA). The concept called for medical and fuel assets to continue the advance with the brigade while the remaining elements of the R³ established the site. With this operation, the support battalion was now split into three main elements, the R³ forward, the R³ main, and the trailing "Fat Lady". The establishment of a BSA in this vicinity was in keeping with the division's operation order. The brigade would conduct deliberate attacks on the Republican Guard forces. The plan was to out-range their weapons systems, minimize friendly casualties, and take as long as needed to systematically destroy the Iraqi forces. During these attacks, BSA operations would sustain the brigade and allow division and corps combat service support to catch up and establish forward operating bases. However, the overwhelming success of the ground campaign quickly changed the campaign into one of exploitation.⁸

Just one hour after being told to establish a BSA, the order came to continue movement east. The rout of the Iraqi military was underway.

By late afternoon the R³ was again consolidated and in position just behind the lead battalion task force with the other two battalion task forces flanking its left and right. Just as the R³ was closing, the brigade began an engagement with Republican Guard forces that would continue through the night and into the following morning. Other than the Iraqi forces, the major concern confronting the brigade was the inadequacy of fuel. The last of the support battalion's fuel tankers had been emptied as had most of the brigade's organic HMMT fuelers. Fuel resupply had yet to arrive; the rugged desert terrain had slowed resupply efforts with many of the 5,000 gallon tankers bogged down in the sand. During the night, approximately 40,000 gallons of diesel fuel was obtained from the reserve brigade, and the first resupply convoy arrived just after daybreak the next morning. The brigade was refueled and ready to continue the fight. At one point, during the battle, fuel enroute to the brigade was diverted by division leadership to the adjacent division because we had enough fuel for several more hours of operation and they did not. This fact was reported at an after action review several days later.

The reserve brigade passed through our brigade the morning of 27 February 1991. Two brigades of the Tawakalna division had been largely destroyed by the brigade.⁹ Most of the soldiers in the brigade task force got a well deserved rest for the remainder of the day. Ammunition resupply, packaged on corps trailers, came forward and an ammunition transfer point (ATP) was established by the support

battalions ammunition section. Units replenished expended stocks, but most of the ammunition remained on the corps trailers which were recovered by corps support units a few days later. The brigade would not engage in combat again.

On 28 February 1991, President Bush declared a temporary cease-fire.¹⁰ Kuwait had been liberated and the remnants of the Iraqi Army were either surrendering or moving northward back into Iraq. As the division reserve, the brigade moved to the Kuwaiti-Iraqi border and set up operations on the Iraqi side of the border. The division's other two combat brigades were positioned on the Kuwaiti side. On 1 March 1991, the "Fat Lady" closed with the R³. The brigade task force was now in one location for the first time since 14 February 1991.

Post Combat Operations

In a few days, the mission of securing and defending the northern border of Kuwait was given the brigade. The brigade task force moved north to the demarcation line along Highway 8 in Iraq. As the terms of the permanent cease-fire were worked out by the nations involved, the support battalion supported the brigade's border mission along the cease-fire line. This marked the first time since its arrival in Southwest Asia that the support battalion was able to fully provide the brigade with combat service support. This was true in part because CSS units at division and corps level began pushing supplies forward to the BSA. Until redeployment of the brigade to Germany some two and one half months later, logistics support would continue to mature.

In addition to supporting the brigade task force, the support battalion provided rations, water, and medical services to hundreds of displaced refugees and deserting Iraqi soldiers.

On 21 March 1991, most of the brigade, to include the BSA, moved south to a location in northern Kuwait, but continued to perform the border mission until early April 1991. Once relieved of the border and medical civilian assistance program (MEDCAP) missions, the brigade focused on weapons firing and maintenance for its remaining time in Kuwait.

In April 1991, the weather began to warm. The heat and frequent sandstorms made living and working conditions miserable. Leaders began to look for ways to alleviate some of the discomfort caused by the harsh environment. Ice became a command interest item and ice distribution became a nightmare. With insufficient reefers to accommodate increased tonnages of ice, its movement down to soldier/ice chest level became a top priority upon each and every receipt. Sporadic delivery of ice from contractors and the lack of proper storage facilities also caused problems with food preparation. Many times food spoiled and sometimes more than one meal had to be prepared to prevent spoilage. To compensate for this, the support battalion built a reserve of type "B" rations to issue if perishables spoiled or were prepared and consumed ahead of schedule to prevent spoilage. The "B" rations are mainly canned and dehydrated foods that require larger volumes of water to prepare, but are generally well received by soldiers.

Post Exchange (PX) operations were also established by the support battalion. A "rolling store" serviced units outside the BSA

and a "stationary store" serviced units located in the BSA. PX operations required one officer and approximately twelve soldiers to service units, sustain stockage, and maintain funds and records. Supplies were obtained from storage facilities in Kuwait City and King Khalid Military City (KKMC) in Saudi Arabia. Making such things as stationery, cards, sodas, chips, radios, cookies, and tobacco products available to the soldiers improved their morale by providing some of the comforts of civilization. Though a PX was initially established at the TAA prior to the ground campaign, the support battalion had had limited equipment and personnel to devote to its operation, and it only managed minimal service to supported units. The operations in Iraq and Kuwait after hostilities met with resounding success.

Desert Camouflage uniforms (DCUs) caused frustration for anyone involved in their receipt and issue. Initially, improper procedures were used to issue the uniforms. They were issued from a source at Log Base ALPHA directly to a representative of the brigade S-4. Wrong sizes, improper counts, and poor documentation created problems, so the uniforms were just stacked into piles in the TAA. As the brigade moved to the FAA, the uniforms remained in the TAA to be brought forward by second lift transportation. Many uniforms disappeared, and were accounted for through report of survey procedures. After the ground campaign soldiers grew impatient. They wanted DCUs. It was a fashion statement, and it was a morale issue. At times it seemed a bigger issue than the right to vote. This time, correct receipt and issue procedures were used with the main and forward support battalions handling

the mission. The big problem now was getting units to determine what sizes were needed. The numbers changed daily, sometimes hourly. After many days and nights, countless inventories, and untold exchanges, the uniforms were issued about the time redeployment operations began. It was just in time to be welcomed home as desert heroes.

Redeployment

On 10 May 1991, the brigade and support battalion left Kuwait and its burning oil fields enroute to Saudi Arabia in preparation for redeployment to Germany. The support battalion, brigade headquarters, and a maneuver battalion relocated near KKMC. The equipment was to be turned in at a temporary storage site approximately 20 miles south of the KKMC air terminal. The other two maneuver battalions convoyed from Kuwait to the port at Dammam, Saudi Arabia, where their equipment was also turned in to a temporary storage site. The equipment would not be returned to home station in Germany since the brigade and support battalion were deactivating under the CFE treaty.

On 19 May 1991, the support battalion soldiers left Saudi Arabia enroute to Germany. As the plane lifted off, the soldiers gave a shout of happiness and relief. They were going home; all of them were going home for the support battalion had suffered no casualties. The morning of 20 May 1991 was special. The soldiers arrived at home station and were greeted by flag waving loved ones and friends. The entire post was covered with welcome home posters and banners. The reunion was filled with sounds of laughter, tears of happiness and joy, and sweet embraces. It was indeed a

hero's welcome for a whole battalion filled with American heroes.

The support battalion had been put to a demanding test. It had sustained a heavy maneuver brigade in a harsh environment over extremely long lines of communication for a prolonged period of time. Yes, there was room for improvement; such is to be expected. However, the support battalion demonstrated a willingness and a talent to find a way to support the brigade. The sustainment imperatives of anticipation, integration, continuity, responsiveness, and improvisation became second nature to soldiers faced with challenges every step of the way. The longer the support battalion supported, the better it performed.

Logistics Operations (Doctrine vs. DESERT STORM)

The basic mission of combat service support is to sustain the battle. The sole measurement of successful sustainment has always been the generation of combat power at the decisive time and place.¹¹ The CSS tasks, like the CSS mission, are simply expressed and challenging to achieve. The tasks are to man, arm, fuel, fix, and move the supported force and to protect the sustainment force.¹² Through the use of the sustainment imperatives AirLand Battle doctrine clearly establishes a support forward concept. Sustainment forces must be arrayed to move supplies, replacements and weapons systems as far forward as possible, normally to the field trains in the BSA. They must also evacuate wounded soldiers and damaged equipment from as far forward as possible, usually the combat trains.¹³

Divisional maneuver brigades have no organic CSS assets. A forward support battalion from the division support command (DISCOM) provides dedicated CSS to each maneuver brigade and to units supporting the brigade, such as its direct support field artillery battalion.¹⁴ The forward support battalion is the logistics link from the DISCOM and higher echelons of support to the brigade and its subordinate units.¹⁵ Whenever possible, the support battalion supports forward of the BSA.

To accomplish brigade level logistics the forward support battalion is organized in a multifunctional configuration. The battalion has a headquarters and headquarters detachment, supply company, maintenance company, and medical company. Specifically, it supports the brigade and the reinforcing/support units by providing or coordinating to provide all classes of supply, as well as maintenance, medical, field services and transportation support in the amounts and at the time specified by the brigade. In addition the FSB is responsible for the security of the BSA and operates under the brigade command for this mission. The FSB may receive additional assets from the MSB or a corps logistics battalion task force to provide required support beyond **its capability**.¹⁶ The base of operations for the FSB is the BSA, whose size varies with the terrain, but an area of 4-7 kilometers in diameter is the doctrinal planning guideline. Although the bulk of the FSB is based in the BSA, maintenance and medical teams are habitually placed forward in the combat trains of the maneuver battalions.¹⁷ Maneuver battalions' field trains are located in the BSA by doctrine, as is the brigade rear command

post (rear CP) which includes the brigade's S-1 and S-4 sections.

Offensive and Deep Operations

The conduct of Operation DESERT STORM's ground campaign was a classic offensive operation. It contained movements to contact, hasty and deliberate attacks, exploitations, and pursuits. With movements to contact possibly approaching several hundred kilometers, procedures pertaining to deep operations were also applicable. Printed doctrine contained in Army field manuals provided excellent guidance for logisticians. The following excerpts from manuals demonstrate how applicable doctrine was to operations in the deserts of southern Iraq.

CSS operations in the offense are designed to maintain the momentum of the attack.... The FSB commander and his staff tailor a mobile CSS package to be pushed forward to support the brigade.¹⁸

By creating the R³, the support battalion tailored a CSS package that accompanied the brigade on movement to contact.

There are two options during deep maneuvers in maintaining CSS to the brigade. The FSB can accompany the brigade with the minimum assets to haul Class III and V supplies. With this option the FSB folds in the brigade's movement formation, protected by adjacent combat elements and the inherent security offered by speed of movement. This method allows the brigade commander flexibility. He can assign CSS after operations begin and have support well forward when critically required.

The less complicated second alternative is to augment the maneuver battalions with Classes III and V supply assets from the FSB. Each battalion then supports itself with its organic and attached assets. This increases speed of resupply and security, thus enhancing decentralization.¹⁹

The support battalion used both options in an effort to combine the advantages of each option. The R³ tucked into the brigade's wedge formation and afforded the brigade commander with

a flexible CSS package that could be applied when and where needed. The combat trains of maneuver battalions were augmented with Class III and V, medical forward treatment teams, and maintenance support teams. This gave the brigade the advantages of the second alternative.

The brigade will carry as much Class III and V as possible. To carry more critical Class III and V supplies, maneuver elements will likely download nonessential supplies and equipment. They will leave behind with the field trains all nonessential personnel and major equipment (for example, food service teams, trucks, kitchen trailers, S-1 sections). ... Maintenance elements for quick repair and medical personnel and equipment to perform emergency treatment may also accompany the brigade.²⁰

Nonessential personnel and equipment from the brigade and support battalion were consolidated into a trail support package. This package was referred to as the "Fat Lady".

If sustainment is to be provided over a line of communication (LOC), the essential elements of the FSB will likely accompany the brigade. They will be required to receive and issue supplies, assist in the effort to repair and recover/evacuate damaged equipment, and provide additional patient acquisition, treatment, and evacuation capability.

Such an operation will likely involve the brigade's participation in a division deep operation over extended distances or time periods.... To support such operations the FSB itself will normally require additional support from the MSB or other division or nondivisional elements. This may well include ... additional 5,000-gallon tankers, trucks to move ammunition.... Additional corps tractor-trailers uploaded with ammunition may travel with the Class V section so that when the ATP arrives at the new site ammunition is immediately available.²¹

Prior to the start of the ground campaign, the FSB received fifteen additional 5,000 gallon tankers from the MSB to be used during movement to contact operations. This increase, plus a previous augmentation of five tankers, enabled the FSB to

cross the LD with three times its normal fuel hauling capacity. Even though corps tractor-trailers uploaded with ammunition did not accompany the FSB, they did proceed with the DISCOM and were available if needed. The FSB was also augmented with additional medical personnel and equipment from the MSB and corps.

Since deep operations are risky and so dependent on the factors of METT-T, bold, innovative approaches must be taken in supporting them. Risks must be identified and conveyed to the operational commander in terms that are meaningful to him. Then risks are reduced to the minimum by careful planning and bold execution.²²

Sustaining the brigade with fuel required support battalion soldiers to boldly execute convoys over extended distances to and from tanker transfer points in extreme weather and terrain in conditions and under uncertain enemy presences. In case of chemical attack, decontamination supplies throughout the brigade were critically short. Drinking water, a precious commodity, would have to be used in the event of chemical attack. The extremely long distances that would have to be covered if medical evacuation was necessary was also of high concern. Air evacuation assets were available, but frequent sandstorms may have prevented their use. Even though fail safe solutions to these risks were not available, the brigade entered combat with carefully planned alternative options. Also, a certain amount of risk just had to be accepted.

Movement

The movement of the R³ during the ground campaign required careful planning and rehearsal. This tailored logistics package designed for critical and essential forward support was not small

by any stretch of imagination. It consisted of approximately 400 vehicles and 800 soldiers. It was roughly twice as big as the "Fat Lady" and was composed of tracked and wheeled vehicles.

Tracked vehicles consisted of armored personnel carriers, command posts, recovery vehicles, Chapparels and bridge-launchers. All served as recovery vehicles when needed. Wheeled vehicles covered the entire range of models in the Army's inventory with a few exceptions. Commercial Utility Cargo Vehicles (CUCV's) had proven unreliable in the desert terrain, and were exchanged for Highly Mobile and Maneuverable Wheeled Vehicles (HMMW's) at the TAA. Within the brigade task force, the only CUCV's to enter Iraq were a few maintenance "contact" trucks. Forklifts were also left behind because transporters were not available to haul them, and they were too slow to move under their own power. A transportation request was submitted to the DISCOM Movements Control Center (MCC) to have the forklifts delivered to the support battalion when transportation assets became available. The forklifts were located at the "Fat Lady's" Logbase ECHO Site in Saudi Arabia.

The R³ movement concept was developed at the TAA and several sandbox training rehearsals were conducted with key personnel. Most of the planning was accomplished in a joint effort between the brigade S-4 and the support battalion S-3. One brigade and two division level rehearsals at the TAA enabled leaders to become comfortable with the movement.²³ The big rehearsal came when the division moved from the TAA to the FAA. This was a two day move for the brigade and support battalion. Because the brigade was to be the lead brigade in a division with

brigades-in-column formation, it had to move farther than the other brigades. During this move the brigade task force used approximately 10,000 gallons of fuel per hour when equipment was operating. This fact enabled both maneuver and forward support battalions to justify additional fuel hauling capability. Additional assets were delivered prior to the start of the ground campaign.

To shorten the logistics tail, the R³ moved in eight columns. To the extent possible, unit integrity was maintained within columns, and columns were positioned to facilitate support. For example, the infantry battalion's trains were on the left side of the R³ since the infantry battalion formed the left flank of the brigade's wedge formation (See Figure 1, App. I). Other forward support battalions in the division moved assets forward in a similar manner, but all differed somewhat in organization and procedures.²⁴

R³ Command and Control

Command and control of the R³ was the responsibility of the support battalion commander. Each column was led by a company commander who was responsible for the vehicles within that column. Lead vehicles in each column keyed and guided on the brigade S-4's HMMW and M577 which preceded the main body by a quarter mile. The brigade S-4 in turn used the military police platoon leader as the link between him and the unit immediately to the R³'s front. The rule of thumb was to stay within sight of the unit in front. The support battalion XO was positioned at the rear of the R³ to

ensure all vehicles in need were recovered. The support battalion S-3 was used to relieve either the brigade S-4 or the support battalion X0 when the need arose.

To ensure that the brigade advanced on the correct avenue of approach, the brigade staff published way points for each of the maneuver battalion task forces. The R³ used the same way points as the lead and center battalion task force. These way points constituted the brigade's main axis of advance and were used extensively, not only as control measures, but for logistics points of interest. The way points along the brigade's center axis were planned as the brigade's ambulance exchange points, EPW collection points, maintenance collection points (never used), and main supply route (MSR). Key leaders were furnished navigational devices, either LORANS or GPS, that enabled them to know and report their locations.

More than once, redundant means of communications enabled the R³ to stay intact and to communicate with Brigade. Column leaders were equipped with FM and hand held radios. The brigade's FM logistics net was used to control the R³. Vehicle mounted MSE phones also enabled the support battalion to keep contact with DISCOM some of the time. The hand held radios were used as a back up for R³ control.

The support battalion commander was on the brigade command net and the brigade S-4 and support battalion S-3 were on the brigade operations and intelligence (061) net. Communication within the brigade was never a major problem; however, communication with DISCOM was not attainable at times. If

emergency conditions had existed, the DISCOM could have been contacted by brigade through the division command or 061 net.

Refuel Operations

To accommodate refuel operations and to maximize security of maneuver battalion fuel assets, half moved with the battalion task force and half traveled with the R³. Support battalion tankers moved in the center columns for protection. During refuel operations the following actions would occur; assets in the battalion task force would refuel combat systems and vehicles; support battalion tankers would move forward of the R³ with a military police escort; battalion task force fuel assets in the R³ would move forward to the combat trains, filled and ready for the next move; empty task force fuelers would return to the logistics release point (LRP) just ahead of the R³, refuel, and remain in the R³; emptied support battalion fuelers would return rear-ward for refuel; and remaining filled support battalion tankers would fall in on the R³ as movement to contact continued. This procedure was practiced during the move from the TAA to the FAA, and it became standard procedure during combat operations.

R³ Security

During movement to contact operations and throughout the engagement with Republican Guard forces, the R³ remained tucked inside the brigade's wedge for protection. This technique puts the support battalion closer to the front line of troops (FLOT) than doctrine recommends (25-30 kilometers), but it affords CSS assets the most

protection during deep operations.²⁵ In addition to the security provided by the maneuver battalion task forces, internal R³ security was provided by Chapparals, engineer M113s mounted with M2 machine guns, and military police ~~HMW~~'s mounted with M60 machine guns. These internal security forces were controlled by the support battalion S-3. During overnight laagers, security was expanded on the perimeters, berms were built around fuel tankers, and the brigade rear CP and FSB TOC co-located near the center of the R³. The brigade S-4's M577 served as the hub with key leaders' vehicles encircling the track vehicles.

Soldiers were instructed to dig sleeping positions at all overnight stops. Sleeping within vehicles was not permitted. Additionally, all soldiers slept on cots for protection against desert wildlife. Sleeping positions were dug so that ground level was at least six inches above the soldier lying on a cot. The main purpose of digging a sleeping position was to protect against indirect fires. This procedure was a challenge to enforce initially. But as the R³ witnessed increased contact with Iraq forces, soldiers seemed more willing to dig.

Throughout combat operations, the R³ was never threatened. Only once were dismounts observed on the left flank, and they were quickly neutralized by the infantry battalion task force.

Brigade Support Area

The brigade commander supported the doctrinal BSA concept. During his eighteen months of command prior to deployment to Southwest Asia, he had insisted that the brigade operate with a

BSA. Key leaders within the maneuver battalion were directed to receive a BSA briefing given by the support battalion. The LOGEX conducted during the summer of 1990 prior to the CMTC rotation had been at the brigade commander's direction.

The BSA is the personnel and logistics hub of the maneuver brigade. It includes the brigade rear CP; FSB; selected COSCOM elements; field trains of subordinate maneuver, DS Artillery, and engineer battalions; DS MPS; MI battalion elements; and part of the division extension signal platoon that supports the brigade.²⁶

The brigade uses a system of combat and field trains to provide unit-level CSS for its maneuver units. Trains are organic to the maneuver TFs and are organized and equipped to provide support well forward. The FSB provides logistics and health services support to the battalion TF field trains, which are normally located in the BSA. The battalion TF field trains, supervised by the HHC commander, support the battalion TF and subordinate company team trains. When battalion field trains operate from the BSA, they are OPCON to the FSB commander for positioning and defense.²⁷

The FSB staff coordinates all operations in the BSA. It plans, organizes, and conducts rear operations in the BSA. The FSB is also responsible for the subordinate elements located in the brigade's rear but not physically in the BSA, such as a forward Class III supply distribution point.²⁸

All of the above doctrinal concepts were totally integrated into the brigade's operations in Southwest Asia.

Because of the terrain, the layout and defense of the BSA did require some adjustments to normal procedures. The desert has no real terrain features or avenues of approach. You could be seen and approached from all directions. To maximize security, the brigade commander recommended that all units in the brigade task force set up in a star configuration. This type layout would afford 360 degree security and could be set up in minimum time.

For the BSA, rather than each unit forming a star shaped perimeter, each company sized element within the BSA occupied a portion of the star. For example, the maintenance company of the support battalion occupied a section of the star with the mid point of its perimeter responsibility represented by a point in the star. The number of points in the star was dependent on the number of units in the BSA. The only company sized unit with no outer BSA perimeter responsibility was the medical company, which was positioned near the center of the BSA. The medical company and other small units within the BSA formed complete star shaped perimeters. (See Figure 2, App. 1)

Earthmoving equipment from the brigade's supporting engineer battalion was used to build berms and dig positions. One goal was either berm or dig in all equipment, work areas, sleep areas, and fighting positions.

During the ground campaign in Southwest Asia, the brigade did not establish a BSA. The war was over too soon. The R3 could be described as a BSA forward, with the "Fat Lady" classified as a BSA Rear. For Operation DESERT STORM, this split BSA concept worked well for the long movement to contact operation. Similar splits of the BSA have been considered for Airland Battle-Future, whereas the MSB is eliminated and larger FSB's operate a BSA Forward and a BSA Rear.²⁹

BSA's were established at three locations. The TAA, Southern Iraq, and Northern Kuwait. Because of late arriving equipment the BSA in the TAA never fully developed. The first time a fully developed BSA was

established was during the brigade's border guarding and humanitarian relief missions in Southern Iraq. It was at this time that the MSB began pushing some supplies to the BSA (food, bottled water, and fuel). The BSA remained at this site for two weeks, before moving to its final location in Northern Kuwait. The BSA operated out of this final site for six weeks. Although hostilities were over, the support battalion's mission of providing combat service support to the brigade task force never ended. The ten weeks in the desert following the war were the best training days

the support battalion could possibly have. The star shaped design worked well. Each time the BSA relocated, this standard type layout made it possible to resume operations sooner. The biggest facilitator for executing the BSA layout was the availability of the engineer battalion's earthmoving equipment.

The desert presented a harsh logistical environment, but it provided unparalleled flexibility and, at the same time, standardization. BSA configuration and security were not terrain-dependent because there were no significant terrain features.³⁰ Therefore, a standard layout simplified procedures for both operations and security. The area of land covered by the BSA was approximately half the area recommended by doctrine. Since terrain features afforded no protection or concealment, a more compact area was easier to secure.

Lessons Learned/Recommendations

During the time between notification for deployment in November 1990 and redeployment to Germany in May 1991, the support

battalion learned many lessons about supporting a heavy maneuver brigade task force. Modifications to the battalion's Organizational structure, equipment, and procedure can enhance future operation. Issues discussed herein apply to a forward support battalion and may or may not be applicable to other units.

Travel light. The battalion shipped too many supplies to Saudi Arabia. The battalion spent a lot of money and time in Germany buying supplies and packing MILVANS and SEALAND vans with "nice to have" items that were not necessary. Anyway, the containers arrived in theater too late to use. Even if they had arrived earlier, there was no space available on vehicles to haul these "nice to have" items. Some items that were needed were shipped in containers and were not available for use. If items are necessary, load it on or ship it with the unit's vehicles.

Much of the battalion's wheeled vehicle fleet was not suitable for off-road travel. Forward support battalions need to be equipped with vehicles that have cross country mobility. Replace CUCV's, medium cargo trucks, and tractor-trailer systems designed for on road travel with HMMW's and HEMTT cargoes, HEMTT fuelers, and HEMTT tractors. A larger HEMTT design would replicate current systems without increasing personnel requirements. Vehicles equipped with palletized loading systems (PLS) are needed in forward support battalions to replace forklifts, which require nonresponsive or nonavailable transporter support to move long distances.

Modify vehicles. Modify all military vehicles with external racks for hauling personnel gear, rations, barrier

matériel, and necessary items such as bottled water. Vehicles need to be modified to incorporate some type of blackout screen and anti-windshield glare mechanism. Command and control vehicles often become operation centers and are manned continuously, thereby creating a need for interior light discipline. To decrease the sun glare on windshields, camouflage nets and mosquito nets were used, and therefore, unavailable for their intended purpose. All vehicles should be equipped with some type of tow rope or cable that enables and enhances self-recovery. Infra-red strobe lights are needed for all vehicles to enhance recovery and identification upon becoming disoriented or lost.

GPS and NVG required. Global positioning systems (GPS) and night vision goggles (NVG) are essential to responsive logistics. Valuable time is gained when combat service support soldiers are properly equipped with navigation aids.

Transportation augmentation. The supply company of a forward support battalion needs to be augmented with a transportation platoon. Such an augmentation gives the support battalion flexibility needed to support the brigade task force. This flexibility is needed when the doctrinal "push" system is disrupted and a "pull" system has to be initiated. It will also provide the assets needed for personnel replacements, EPW evacuation, mass casualty support, and PX operations. So essential was such a platoon in Southwest Asia, that the support battalion with the assistance of the maneuver brigade commander, formed one out of existing brigade and battalion assets. This 1—as possible because such a requirement had been perceived and

additional HEMTT cargoes were issued to units. By consolidating these assets, approximately twenty HEMTT's under the control of the support battalion, the brigade received support that would otherwise have been much more difficult to obtain. Missions for the transportation platoon were managed by the Support Operations Section of the FSB in conjunction with the brigade 5-4. The supply company executed the missions.

Mobility improvements. The FSB TOC by doctrine is composed of one 5 ton expandable van and an assortment of tentage.³¹ The FSB used two 5 ton expandable vans in Southwest Asia (most FSB's do). However, replacement of the 5 ton expandable vans with M577's would enhance mobility and displacement operations for support battalions. Operations during movements are possible with M577's, whereas they are not with the expandable vans. Terrain and other conditions of METT-T permitting,

Standardize BSA layout. BSA layouts should be standardized to facilitate movement, relocation, and familiarization.

Minimize BSA movement by use of R³ concept. Movement of the BSA causes disruption in sustainment support provided to the maneuver brigade. Do not move the BSA just for the sake of moving it. This is substantiated by doctrine, even though doctrine also states that the BSA should be able to relocate every 24 hours.³² For fast moving operations, utilize the R³ concept for forward support.

Relook repair parts system. The repair parts supply system never worked vewry well because of system problems above the support battalion level. It is essential, however, to continue

sound and prudent maintenance procedures within the brigade. Operational status of equipment should be continuously tracked and managed. The support battalion must know what its supported units need and either find alternative methods of obtaining repair parts, or be ready to capitalize when options become available. Prior to the ground campaign, the permission to cannibalize was given to help units enter combat at maximum possible strength. During the last month of operation, the support battalion found critical repair parts by sending a repair parts clerk to KMC in Saudi Arabia each day via helicopter to screen Stockpiles left by departing units. These parts were then trucked or flown to the BSA in Kuwait. The point is, no matter how bad the system is, be proactive and ready to take advantage of any and all opportunities. Systems broken at theater level will not be fixed at brigade or battalion level.

Field SEE to CSS units. BSA security would be enhanced by fielding the Small Emplacement Excavator (SEE) in combat service support units. Valuable time now spent preparing individual fighting positions with manual labor could be used supporting the brigade task force.

These lessons learned with applicable recommendations represent only a portion of the knowledge gained by units during the time spent in the deserts of Southwest Asia. As stated, only brigade and support battalion level operations have been addressed. Undoubtedly, there are many more that were experienced by other support battalions. Once compiled, they will serve as a basis to improve or sustain future logistics support.

Conclusion

Although volumes of lessons learned have been or will be written about Operations DESERT SHIELD and DESERT STORM logistics' shortfalls, review and comparison of doctrine to actual application will also show that sufficient doctrinal guidance was in place and amply executed. Perhaps the most important logistics' lesson during the course of desert operations in Southwest Asia was that logisticians must never lose sight of Airland Battle's sustainment imperatives of anticipation, integration, continuity, responsiveness, and improvisation. Through aggressive application of these imperatives logisticians at all echelons were able to circumvent all major road blocks impeding mission accomplishment. Any new ground covered was a direct result of actions taken by bold leaders using these doctrinal sustainment imperatives as a foundation.

ENDNOTES

1. U.S. Department of the Army, Field Manual 63-20, Forward Support Battalion, (Washington, D.C.) 1990, p. 1-2.
2. Steve Vogel, "The Tip of the Spear", Army Times, (13 January 1992), p.10.
3. Ibid.

4. H. Norman Schwarzkopf, "Central Command Briefing", Military Review, (September 1991), p. 99.

5. Gail Thueson, "The 100-Hour Storm", Spearhead, vol. 2, no. 1, (Spring 1991), p. 9.

6. Ibid.

7. Second Brigade, Third Armored Division, "First Impressions, Consolidated Battle History, 14 Feb. 91-27 Feb. 91," (undated), p. 8. (Mimeographed.)

8. Ibid., p. 9.

9. Vogel, p. 13.

10. George Bush, "Suspension of Allied Offensive Combat Operations", Military Review, (September 1991), p. 86.

11. U.S. Department of the Army, Field Manual 100-10, Combat Service Support, (Washington, D.C.) 1988, p. 1-2.

12. Ibid., p. 1-869

13. Ibid., pp. 1-10, 1-11.

14. Ibid., p. 1-17.

15. F.M. 63-20, p. 1-3.

16. Ibid., p. 2-3.

17. Ibid., pp. 2-465.

18. U.S. Department of the Army, Field Manual 71-3, Armored and Mechanized Infantry Brigade, (Washington, D.C.) 1988, pp. 3-7.

19. Ibid., p. 7-6.

20. F.M. 63-20, pp. 2-12.

21. Ibid., p. 2-13.

22. F.M. 100-10, p. 2-14.

23. Thueson, p. 8.

24. Gordon T. Kennedy "Moving the Brigade Support Area", Quartermaster Professional Bulletin, (Autumn 1991), pp. 4-5.

25. U.S. Department of the Army, Field Manual 63-2, Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions (Washington, D.C.) 1991, p. 1-4.
26. F.M. 71-3, p. 7-1.
27. Ibid., p. 7-5.
28. Ibid.
29. James S. Emery, "Supporting Airland Battle-Future", Quartermaster Professional Bulletin, (Spring 1991), p. 8.
30. Kennedy, p. 5.
31. F.M. 63-20, p. 3-13.
32. Ibid., p. A-1.

BIBLIOGRAPHY

- Bush, George. "Suspension of Allied Offensive Combat Operation," Military Review, September, 1991.
- Byther, Douglas B. "DESERT SHIELD Contingency Contracting," Quartermaster Professional Bulletin, Winter, 1990.
- Emery, James S. "Supporting Airland Battle-Future," Quartermaster Professional Bulletin, Spring, 1991.
- Fortner, Joe A.; Doux, Jules T.; and Peterson, Mark A. "Bring on the NETs!," Military Review, January, 1992.
- Gilroy, Michael P. "The Brigade Supply and Transport Company-Support for Airland Battle-Future," Quartermaster Professional Bulletin, Winter, 1990.
- Hewitt, Bill and Wilhelm, Maria. "After the Gunfire: Mission of Mercy," People, 15 April, 1991.
- House, Randolph W. and Johnson, Gregory L. "C2 in a Heavy Brigade Movement to Contact," Military Review, November, 1991.
- Jensen, Ron. "Land Battle in Gulf War Went Exactly as Planned," Interview with Funk, Paul E. The Stars and Stripes 21 April, 1991.

Kennedy, Gordon T. "Moving the Brigade Support Area," Quarter-master Professional Bulletin, Autumn, 1991.

Kindsvatter, Peter S. "VII Corps in the Gulf War," Military Review, January, 1992.

Langenus, Peter C. "Moving an Army, Movement Control for Operation DESERT STORM," Military Review, September, 1991.

Motrynczuk, Peter. "The Army Family of Rations," Quartermaster Professional Bulletin, Autumn, 1991.

Pagonis, William G. and Raugh, Harold E. Jr. "Good Logistics is Combat Power," Military Review, September, 1991.

Pardew, James W. Jr. "The Iraqi Army's Defeat in Kuwait," Parameters, Winter, 1991-92.

Phelps, Lawrence P. "DESERT STORM: Lesson Learned for the Junior Logistician," Quartermaster Professional Bulletin, Autumn, 1991.

Schwarzkopf, H. Norman. "Central Command Briefing," Military Review, September, 1991.

Scicchitano, J. Paul. "Attacking Deep into Desert: A Logistics Coup," Army Times, 11 March, 1991.

Second Brigade, Third Armored Division. "First Impressions, Consolidated Battle History, 14 FEB 91-27 FEB 91," undated. (Mimeograph No. 1)

Szafranski, Richard. "DESERT STORM Lessons from the Rear," Parameters, Winter, 1991-92.

Thueson, Gail. "The 100-Hour Storm," Spearhead, vol. 2, no. 1, Spring, 1991.

United States Army, VII Corps. "Operation Desert Shield/Storm," The Desert Jayhawk, undated.

U.S. Department of the Army, Field Manual 10-272, Tactics, Techniques and Procedures for Quartermaster Direct Support and Field Service Operations. Washington, D.C.: GPO, 1991.

U.S. Department of the Army, Field Manual 43-12, Division Maintenance Operations. Washington, D.C.: GPO, 1989.

U.S. Department of the Army, Field Manual 63-2, Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions. Washington, D.C.: GPO, 1991.

U.S. Department of the Army, Field Manual 63-20, Forward Support Battalion, Washington, D.C.: GPO, 1990.

U.S. Department of the Army, Field Manual 71-3, Armored and Mechanized Infantry Brigade, Washington, D.C.: GPO, 1988.

U.S. Department of the Army, Field Manual 100-10, Combat Service Support, Washington, D.C.: GPO, 1988.

U.S. Department of the Army, Office of the Deputy Chief of Staff for Logistics, Operation DESERT STORM Sustainment, undated.

Vogel, Steve. "The Tip of the Spear," Army Times, 13 January, 1992.

Yeosock, John J. "Army Operations in the Gulf Theater," Military Review, September, 1991.